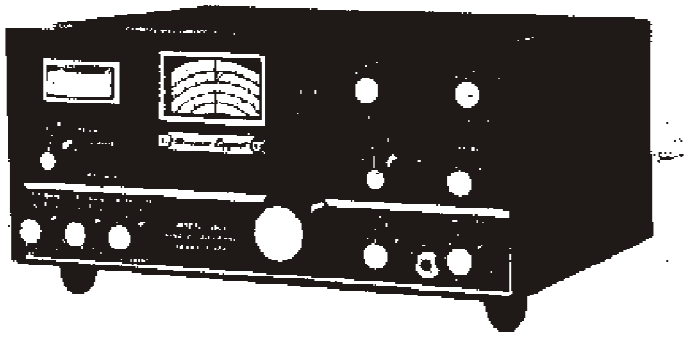
OPERATION AND MAINTENANCE



SWAN CYGNET MODEL 300B

SWAN
ELECTRONICS
A subsidiary of Cable Corporation
OCEANSIDE, CALIFORNIA

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OPERATION AND MAINTENANCE
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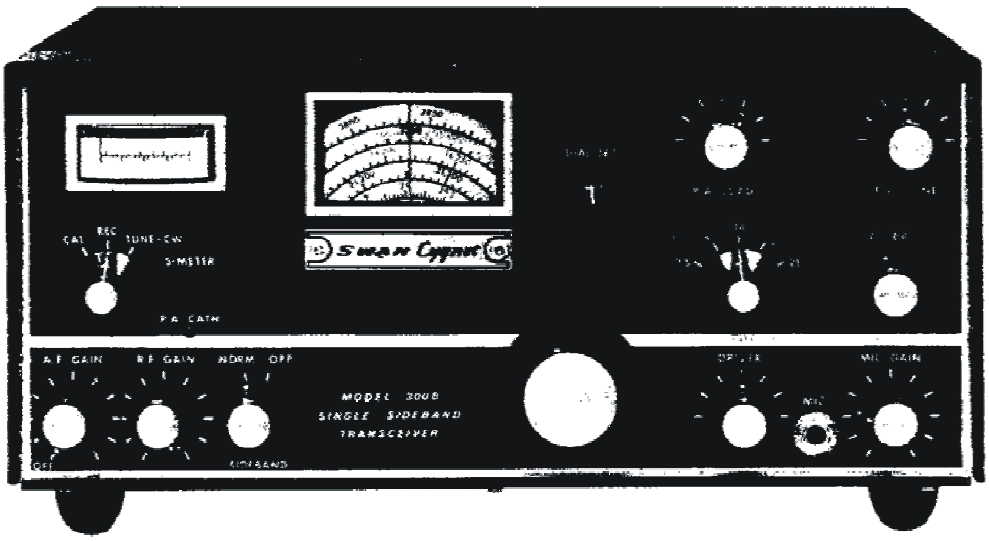


INTRODUCTION

The Swan Cygnet Model 300B Single Sideband Transceiver is designed to be used in either CW or SSB modes on all portions of the 80-, 40-, 20-, 15-, and 10 meter amateur radio bands.

Power input on all bands exceeds 300 watts, P.E.P., on single sideband and 200 watts on CW. The Model 300B includes automatic gain control, (AGC), automatic level control, (ALC), and grid block keying.

The basic transceiver provides coverage of all portions of the 80 through 10-meter amateur bands. In addition to this, the amplifier circuits will tune to most MARS frequencies near the 80-, 40-, and 20-meter bands. By using the Model 510X crystal oscillator accessory, MARS operation is thus possible.

The internal AC power supply permits fixed station or portable operation wherever 117 volts 50-60 cycles is available. Export models for 208-220-240 volts are available on special order.

For 12-14 volt DC operation in mobile, marine or portable applications, a DC converter unit, model 14A is available. It attaches to the back of the 300B in place of the AC power cord connector. Its dimensions are only 1¼ x 3 x 4 in.

The Model 300B generates a single sideband signal by means of a crystal lattice filter, and the transceiver operation automatically tunes the transmitter to the received frequency. Provisions are included in the transceiver for operation on either upper or lower sideband.

Basic circuitry of the single conversion design has been proven in several thousand of the popular Swan transceivers. Mechanical, electrical, and thermal stability is exceptionally high. All oscillators are temperature compensated and voltage regulated. Push-to-talk operation is standard, with provision for plugging in the Model VX-2 accessory Vox unit for automatic voice control and CW break-in.

SPECIFICATIONS

FREQUENCY RANGES

80 Meters	3.5 to 4 mc.
40 Meters	7.0 to 7.300 mc.
20 Meters	14.0 to 14.350 mc.
15 Meters	21.0 to 21.450 mc.
10 Meters	28.0 to 29.7 mc.

POWER INPUT

Single Sideband, Suppressed Carrier:
300 watts, P.E.P., minimum on all bands.
CW: 200 watts, dc input on all bands.
AM: (Single Sideband with Carrier)
65 watts dc input on all bands.

DISTORTION

Distortion products down approximately 30 db.

UNWANTED SIDEBAND SUPPRESSION

Unwanted sideband down more than 50 db.

CARRIER SUPPRESSION

Carrier suppression greater than 50 db.

SELECTIVITY

Provided by 5500 Kc crystal lattice filter, 2700 cycles wide at 6 db down, 4600 cycles wide at 60 db down. Shape factor of 1.7 with ultimate rejection greater than 100 db.

RECEIVER SENSITIVITY

Less than 0.5 microvolt at 50 ohms impedance for signal-plus-noise to noise ratio of 10 db.

AUDIO OUTPUT AND RESPONSE

Audio output, 3 watts to 3.2 ohm load. Response essentially flat from 300 to 3000 cps in both receive and transmit.

TRANSMITTER OUTPUT

Wide-range Pi-network output matches resistive loads from 50 to 75 ohms

METERING

Power amplifier cathode current 0-400 ma on transmit. S-Meter 0-70 db over S9 on receive.

FRONT PANEL CONTROLS

AF Gain, RF Gain, Sideband Selector, CAL-REC-TUNE/CW, Mic. Gain, Bandswitch, Carrier Balance, PA Plate Tune, Driver Tune, PA Load, Dial Set, Meter Switch.

REAR PANEL CONTROLS AND CONNECTIONS

CW MAN/Semi, Bias potentiometer, CW key jack, Jones plug power connector, Antenna jack, S-Meter zero, Auxiliary relay switching, Outboard VFO connector, Head-phone jack. The Vox Connector is located on the side of the chassis.

VACUUM TUBE COMPLEMENT

V1 12AU6 VFO Amplifier

VACUUM TUBE COMPLEMENT

V1	12AU6 VFO Amplifier
V2	12BE6 Transmitter Mixer
V3	6GK6 Driver
V4	Power Amplifier 8950
V5	Receiver RF Amplifier 6CB6A or 6BZ6
V6	12BE6 Receiver Mixer
V7	12BA6 First IF Amplifier
V8	12BA6 Second IF Amplifier
V9	12AX7 Product Director/Receive Audio
V10	6AV6AGC Amplifier=Rectifier
V11	6AQ5 AF Output
V12	12BA6 100 KC Calibrator
V13	6JH8 Balanced Modulator
V14	12AX7 Microphone Amplifier

TRANSISTOR COMPLEMENT

Q1	2N706 Oscillator
Q2	2N5130 Buffer
Q3	2N706 Carrier Oscillator

POWER REQUIREMENTS

117 Vac., 60 cps, at 4 amps.
(208-220-240 volt, 50-60 cps, at 2.5 amps max., export model).

12-14 volts DC operation with model 14A converter unit plugged into back of 300B. Current drain: 8 amps, receive mode. 12 amps average with voice modulation. 25 amps maximum in TUNE mode. (See Figure 5, page 9).

DIMENSIONS

Height	5¼ in.
Width	13 in.
Depth	11 in.

WEIGHT

Weight 24 lbs.

INSTALLATION

GENERAL

The installation of the Swan Cygnet is not at all difficult and it involves only the placement of the transceiver in its operational area (fixed or mobile), connection of power (either 117 volts ac, or 12 volts dc), and the connection of an antenna. The following paragraphs are therefore devoted to the installation requirements involving microphones, fixed and mobile operation, and recommended antenna types.

CAUTION

Before actual installation, be sure to check for possible shipment damage. Remove the cabinet (three screws on each side), and check to make sure that all tubes are firmly in place.

FIXED INSTALLATION

Locate the Cygnet in an area which is well ventilated and which provides complete operational freedom of the front panel controls. Connect the ac power cord to the 12 pin Jones connector on the back. If the Cygnet is a 117 volt model, plug the power cord into a standard 117 volt, 50-60 cycle outlet having a capacity of at least 10 amps. If the Cygnet is an Export model, it should first be set to the proper voltage tap: 208, 220, or 240 volts, 50-60 cycles. Remove the cabinet, and locate the terminal strip near the top of the power transformer. There are 3 terminal lugs, and a decal indicates the voltage tap for each. Connection has been made to the 220 volt tap at the factory. If your supply voltage is 208 or 240, unsolder the red colored wire and move it accordingly.

Connect an antenna to the Cygnet which is suitable for the band which is to be used.

FIXED ANTENNAS

A standard PL259 coax connector plug will fit the Cygnet's antenna jack, and 50 or 75 ohm coax cable to the antenna is recommended. RG58 or RG59 is satisfactory for runs up to 50 feet. For longer runs the larger RG8 or RG11 produces less line loss, particularly on 10 meters.

Any of the common antenna systems designed for use on the amateur high frequency bands will work well with the Cygnet. However, the amateur should consider an antenna system which best fits his operational requirements. For example, a rotatable beam antenna is usually best suited on the 20, 15 and 10 meter bands for DX operation, and an inverted "V" or a similar antenna is usually best suited for 80 and 40 meters. Methods for constructing antennas and antenna tuners are described in detail in the ARRL Antenna Handbook and similar publications. It is recommended that these publications be consulted during the design of any antenna system.

MOBILE INSTALLATION

Many different methods of mobile installation are possible, and it is expected that hams will find methods which are best suited for their installation requirements. Swan Electronics has available a Mobile Mounting Kit which is suitable for under-the-dash installations. Figure 4 shows the recommended mounting methods using this kit.

DC CONVERTER, MODEL 14A

For 12-14 volt DC operation in mobile installations, it will be necessary to use the 14A converter, which plugs directly into the back of the 300B in place of the AC power connector. This accessory is available from your Swan dealer. Refer to installation instructions supplied with the 14A converter.

MICROPHONE

The microphone input is designed for high impedance microphones only. The choice of microphone is important for good speech quality, and should be given serious consideration. The crystal lattice filter in the transceiver provides all the restriction necessary on audio response, and further restriction in the microphone is not required. It is more important to have a microphone with a smooth, flat response throughout the speech range. The microphone plug must be a standard ¼ inch diameter three contact type. The tip connection is for push-to-talk relay control, the ring connector is the microphone terminal, and the sleeve is the common chassis ground. The microphone manufacturer's instructions should be followed in connecting the microphone cable to the plug. Either a hand-held or desk type microphone with push-to-talk control will provide a suitable installation.

If VOX operation is being utilized, many mics require modification for VOX. We suggest you contact the mic manufacturer for instructions to modify the microphone.

MOBILE ANTENNAS

Mobile antenna installations are quite critical since the antenna represents a number of compromises when used on the high frequency bands. Many amateurs lose the efficiency of their mobile antennas through improper tuning. Points to remember about the mobile antenna are:

1. The "Q" of the antenna loading coil should be as high as possible. There are several commercial models available which are high "Q" coils, including the Swan Models 35, 45 and 55 mobile antennas. (Contact your Swan distributor or Swan Electronics for details.)

2. The loading coil must be capable of handling the power of the Model 300B without over heating. In TUNE position, the power output of the transceiver may exceed 200 watts. Wide spaced, heavy wire loading coils are essential.

3. The SWR bridge is a useful instrument, but unfortunately it is quite often misunderstood and over rated in importance. Basically, the SWR bridge will indicate how closely the antenna load impedance matches the transmission line. With long transmission lines, such as will be used in many fixed station installations, it is desirable to keep the impedance match fairly close in order to limit power loss. This is particularly true at the higher frequencies. The longer the line, and the higher the frequency, the more important SWR becomes. However, in mobile installations the transmission line seldom exceeds 20 feet in length, and an SWR of even 4 to 1 adds very little to power loss. The only time SWR will indicate a low figure is when the antenna presents a load close to 50 ohms, but many mobile antennas will have a base impedance as low as 15 or 20 ohms at their resonant frequency. In such a case, SWR will indicate 3 or 4 to 1, and yet the system will be radiating efficiently.

4. The really important factor in your mobile antenna is that it should be carefully tuned to resonance at the desired frequency. The fallacy in using an SWR bridge lies in the fact that it is sometimes possible to reduce the SWR reading by detuning the antenna. Field strength may actually be reduced in an effort to bring SWR down. Since field strength is the primary goal, we recommend a Field Strength Meter for antenna tuning.

5. For antenna adjustments, the Swan 300B may be loaded lightly to about 100 ma. cathode current instead of the usual 200-300 ma. This will limit tube dissipation during adjustments, and will also help reduce interference on the frequency. In any case, do not leve the transmitter on for very long at one time. Turn it on just long enough to tune and load, and get a field strength reading.

Start out with the antenna whip at about the center of its adjustment range. Set the VFO to the desired operating frequency and then adjust P. A. TUNE for dip, and P. A. LOAD for 100 ma. Then observe the field strength reading. The Field Strength Meter may be set on top of the dash, on the hood, or at an elevated location some distance from the car.

Change the whip length a half inch, or so, at a time, retune the P. A. for 100 ma. loading each time, and check field strength. Continue this procedure until the point of maximum field strength is found. This adjustment will be most critical on 75 meters, somewhat less critical on 40, until on 10 meters the adjustment will be quite broad. After tuning the antenna to resonance, load the P. A. to full power.

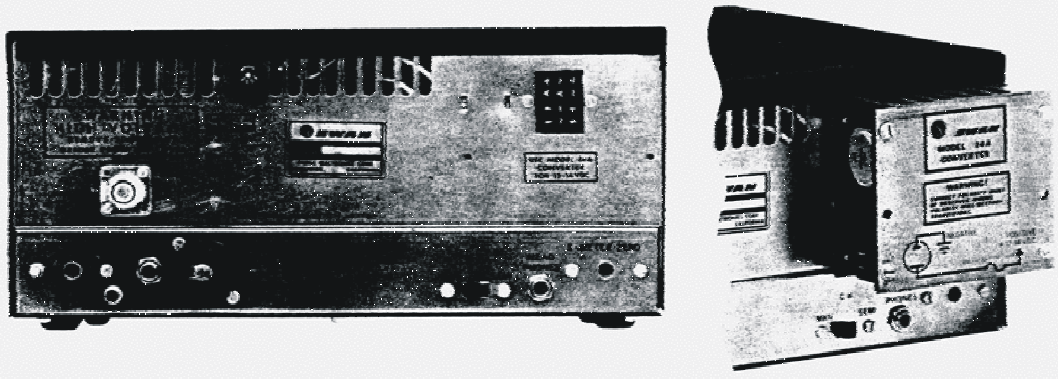


FIGURE 2. SWAN CYGNET MODEL 300B REAR VIEW

CONTROL FUNCTIONS

On-Off Switch (On AF Gain Knob)
Turns power supply on and off.

Cal-Rec-Tune/CW
Calibrate
All voltages are applied to receiver. Grounds cathode of V12.

Receive
All voltages are applied to receiver.

Tune/CW
Transmitting circuits are energized. C1501 is disconnected from ground shifting carrier frequency into filter passband. Carrier is fully inserted. P. A. cathode resistor is switched in, reducing input power.

Mic. Gain
Controls potentiometer R1404 in the grid of V14A and controls amount of audio to the balanced modulator.

Car. Balance
Controls potentiometer R1308 in the balanced modulator deflection plate circuit, and permits nulling out the carrier.

RF Gain
Controls variable resistor R505, common in the grids of Receiver Mixer V6, RF Amplifier, V7 and V8 IF Amplifiers.

AF Gain
Controls potentiometer R1101 in grid circuit of V11 AF Output, and controls audio volume.

Main Tuning
Controls C1612 in frequency determining tank circuit of VFO.

Driver
Controls CS1 and C2B in plate tanks of transmitter mixer and driver.

P.A. Tune
Controls C408 in pi-network to tune final power amplifier plate to resonance.

P.A. Load
Controls C411 in pi-network to match impedance of output load. Tunes input to Receiver RF Amplifier.

Main Bandswitch
Switches tank coils and associated capacitors in VFO, VFO Amplifier, Driver and Transmit Mixer.

Sideband Selector
Selects upper or lower sideband.

Meter Switch
Selects S-meter or P. A. cathode reading.

CW Manual/Semi Break-in Switch
Selects manual or semi break-in CW.

OPERATION

PRE-OPERATION ADJUSTMENTS

Before connecting any cables to the Swan 300B perform the following steps:

1. Locate the P.A. compartment and remove the packing material from the P.A. tube.
2. Rotate the P.A. BIAS control on the rear chassis apron fully counter clockwise.
3. Rotate the CAL-REC-TUNE-CW to REC.
4. Rotate the AF Gain Control counter clockwise to operate the power switch to OFF.
5. Place CW MAN/SEMI switch in MAN position.

CONNECTIONS

1. Connect wire from earth ground to ground stud provided on rear of chassis. This is not essential, but is recommended.
2. Connect a 50 to 75 ohm antenna feed-line to the coaxial connector on rear panel.
3. Connect the power supply cable to the Jones connector on he rear panel.
4. Connect the power supply cable to the proper voltage source.

WARNING

Dangerous high voltage is present on the plate of the power amplifier whenever the power supply is energized.

RECEIVE OPERATION

1. Rotate the AF GAIN Control clockwise to about the 3 o'clock position. The power switch will operate applying voltage to the transceiver.
2. Wait approximately one minute to allow the tube filaments to reach operating temperature. During this period, perform the following steps:
   a. Rotate BANDSWITCH to desired band.
   b. Rotate MIC. GAIN fully counter-clockwise.
   c. Rotate CAR. BAL. control to the midscale position.
   d. Set P.A. TUNE control to mid-position
   e. Set DRIVER control to mid-position.
   f. Set P.A. LOAD to mid-position.
   g. Set tuning dial to desired operating frequency.
   h. Set RF GAIN control to approximately 10 o'clock position.

3. Carefully adjust the DRIVER and the PA TUNE controls for maximum receiver noise.

NOTE

The DRIVER control resonates the transmitter driver stages and the receiver RF amplifier plate circuit. The PA TUNE and PA LOAD controls adjust the input and output capacitors in the transmitter power amplifier final plate circuit, as well as the receiver RF amplifier grid circuit. Proper adjustment of these controls in the receive position will result in approximately resonant conditions in the transmitter stages.

RECEIVER TUNING

Precise tuning of a single sideband signal is very important. Do not be satisfied to merely tune until the voice can be understood, but take the extra care of setting the dial to the exact spot where the voice sounds natural. Above all, avoid the habit of tuning so that the voice is pitched higher than normal. This is an unfortunate habit practiced by quite a number of operators. The following points help to explain the effects of mistuning:

1. If you tune so the received voice is higher than normal pitch, you will then transmit off frequency, and your voice will sound lower than normal pitch to the other station. He will probably retune his dial to make you sound right. If you keep this up, you'll gradually waltz one another across the band. If both of you are mistuning to an unnatural higher pitch, you'll waltz across the band twice as fast. (And someone will no doubt be accused of frequency drift.)

2. Mistuning results in serious harmonic distortion on the voice, and should be quite noticeable to the average ear. Some will claim that if they don't know how the other person's voice actually sounds, they can't tune him in properly, but this is not true. With a little practice, it will be fairly easy to tell. Some voices are relatively rich in harmonics, and are easier to tune in than a person with a "flat" voice. Also, a transmitter, which is being operated properly with low distortion will be easier to tune in than one which is being over-driven and is generating excessive distortion. There is no mistaking when you have a station tuned right on the nose. It will sound just like "AM," so to speak. Mainly, avoid the habit of tuning so everyone sounds higher than normal pitch, or like Donald Duck. This is incorrect, unnecessary, and sounds terrible.
3. A vernier control for receive frequency, sometimes referred to as "incremental tuning," is not available on the Swan 300B. Such a device is not necessary if proper tuning habits are exercised.

4. Your Swan 300B will automatically transmit on exactly the same frequency as the one to which you are listening. There is no adjustment for making them the same, since by using the same oscillator for both send and receive, it happens automatically. If separation of receive and transmit frequency control is desired, the Model 508 or 510X VFO unit may be used.

TRANSMITTER TUNING

Special Notes: Read Carefully. Be sure that you understand and remember these notes when tuning the transmitter.

1. The most important detail to keep in mind when tuning the transmitter portion of your Swan 300B is that the P.A. TUNE control must be resonated as quickly as possible!

2. This is accomplished by adjusting the P.A. TUNE for minimum meter reading with function switch in TUNE mode. P.A. cathode current, as indicated by the meter will show a "dip" as P.A. TUNE is rotated through resonance. Stop at the "dip," or minimum reading.

3. The P.A. tube is dissipating all the power input when it is not in resonance, and can be permanently damaged in just a few seconds.

4. Once resonance has been established, the P.A. can operate at full power input for quite awhile, although we recommend 30 seconds as a safe maximum. But, it is most important to realize that the 30 second limit assumes that the P.A. TUNE control has been immediately resonated. This rule applies generally to all transmitters.

5. Do not tune more often than necessary. You should not have to retune except when changing bands or antennas. The P.A. tube will last for many months or even years of normal operating, but excessive tuning will shorten tube life.

TRANSMITTER TUNING STEPS

1. (a) Sideband Selector in NORM. position. (b) Bandswitch and Tuning Dial to desired frequency. (c) MIC. GAIN at minimum. (d) CAR. BAL. at 12 o'clock. (e) Function Switch in REC. position. (f) Meter Switch in P.A. CATH. position. (g) Mic. with press-to-talk switch pluged in Mic. Jack. (h) CW MAN/SEMI Switch in MAN position.

2. Press the Mic. Switch, and quickly rotate CAR. BAL. control for minimum meter reading. If the control has no effect at this time, do not be concerned. The P.A. (Power Amplifier) stage is now resting, or "idling," and there is no grid drive being applied. The meter is reading "idling" current, which should be about 40 ma. This point is indicated on the meter scale by a small triangular symbol. The permissible idling range is 30 to 50 ma. If the meter does not

read within this range, adjust P.A. BIAS on back of the transceiver. This requires a screw driver, and should not be required often. If idling current tends to creep upward slightly with warm-up, set it at 30 ma. Excessive creep indicates that the P.A. tube is gassy, and may need to be replaced soon.

3. If this is the first time you are tuning the transmitter, set P.A. LOAD to 9 o'clock. After experience in tuning, this control may be pre-set to the previously determined position.

Note: Up to now the transmitter has been "idling," and there has been no particular time limit involved. The following steps apply grid drive, and require caution. Observe the recommended 30 second time limit.

4. With the function switch still in REC. position, again press the Mic. button and:
   a. Set the CAR. BAL. control to 3 o'clock or 9 o'clock.
   b. Rotate the DRIVER control for maximum meter reading.
   c. *Immediately* rotate the P.A. TUNE control for minimum meter reading, or "dip." This is the critical "resonating" adjustment which *must* be *done quickly* to preserve P.A. tube life!
   d. Re-adjust CAR. BAL. for minimum meter reading.

5. Switch to TUNE position and observe meter reading. Begin advancing the P.A. LOAD control clockwise in small steps, each time "dipping" the P.A. TUNE control for *minimum* meter reading. As P.A. LOAD is turned further clockwise, the P.A. TUNE "dip" will become more shallow, until finally it may be difficult to see the dip.

The proper degree of loading is when the dip is about 10 per cent down from the maximum off-resonance reading. In other words, if the meter reads 200 ma when P.A. TUNE is off resonance, is should dip to about 180 Ma. at resonance. Or, if the meter reads 250 Ma. off resonance, then adjust P.A. LOAD so that P.A. TUNE dips to 225 ma at resonance. (*Refer to chart below for additional clarification.*)

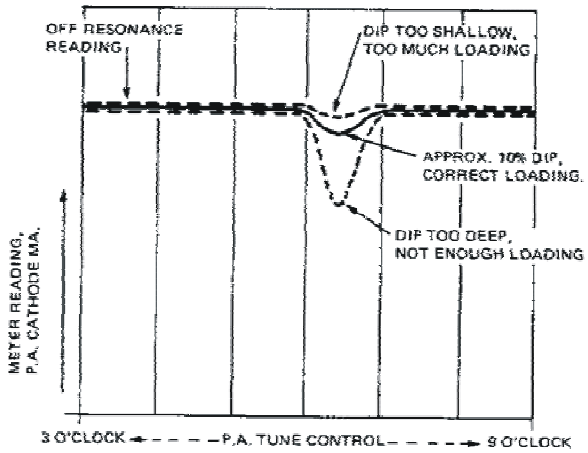
The specific meter reading is not vitally important, and may vary considerably, being less on 10 meters than on 80 meters. Also, tube condition and line voltage can affect the meter reading. It will normally read 200 ma or mre when *off resonance*. With high line voltage and new tubes it may be as high as 300 Ma. Remember, the P.A. should never be held out of resonance for more than a second or two, just long enough to observe the meter reading and tune for the dip.

6. The preceding Step completes Transmitter Tuning procedure. Return the Function Switch to REC. position.

Note that the 300B operates at reduced power in TUNE-CW mode. The P.A. cathode bias resistor, R406 is in the circuit during TUNE and CW operation. In voice mode the bias resistor is shorted out, and the 300B operates at full P.E.P. input rating.

VOICE TRANSMISSION

After tuning up as outlined above, switch to REC. position. Press the microphone switch and then carefully set the CAR. BAL. control for minimum meter reading. While speaking into the mike, slowly rotate the MIC. GAIN control until occasional peak readings of 110 to


OFF RESONANCE READING
DIP TOO SHALLOW, TOO MUCH LOADING
APPROX. 10% DIP, CORRECT LOADING.
DIP TOO DEEP, NOT ENOUGH LOADING
METER READING, P.A. CATHODE MA.
3 O'CLOCK
P.A. TUNE CONTROL
9 O'CLOCK

ILLUSTRATING PROPER P.A. LOAD ADJUSTMENT AS INDICATED BY "DIP" IN P.A. CATHODE CURRENT WHEN TURNING P.A. TUNE CONTROL THROUGH RESONANCE.

130 ma are obtained. With most microphones, the MIC. GAIN control will be set between 9 and 12 o'clock but it may vary considerably. The ALC circuit will help limit cathode current, but turning the MIC. GAIN up too high will still produce flat-topping and spurious signals, so it is important to hold it down. The meter is quite heavily damped, and its reading with average voice modulation may not look very impressive, but the voice peaks are going well over the 300 watt power rating of your Swan transceiver.

NOTE

Transceiver will not modulate properly with Function Switch in CAL. position.

AM OPERATION (Single Sideband With Carrier)

1. Tune transmitter to full output on single sideband as described above.

2. Rotate MIC. GAIN control to *minimum*, full CCW.

3. With push-to-talk pressed, rotate CAR. BAL. control *until* cathode current is approximately 75 ma.

4. While talking in a normal tone of voice into the microphone, increase MIC. GAIN setting until the meter kicks upward slightly. This setting will result in excellent AM transmission.

CW OPERATION

1. Insert a CW Key in the Key Jack on back of the Transceiver.

2. Close the key and tune the transmitter as outlined in Step 5. Power input will be approximately 200 watts.

3. In CW operation without the VOX accessory it will be necessary to switch the Function control back to REC. for receiving and then to CW for transmitting.

4. When the VOX accessory, model VX-2 is used, Break-In operation may be employed. Move the CW MAN/SEMI switch to SEMI position, and rotate the Function control to CW mode. Rotate the VOX GAIN full clockwise and the ANTI-TRIP control on the VX-2 to full counterclockwise position. Press the CW key to transmit. When you stop keying the circuits will automatically switch back to receive mode. Adjust the VX-2 DELAY control to the position which gives the desired delay time in returning to Receive.

5. While receiving, the carrier oscillator frequency is located 300 cycles outside the passband of the crystal lattice filter, thus providing a single heterodyne note, or "single-signal" for CW reception. When transmitting in CW mode, the carrier frequency is moved approximately 800 cycles higher, placing it well inside the passband. This frequency shift is termed "Off-set CW transmit frequency," and avoids the problems encountered when the receive and transmit frequency are exactly the same. This is desirable for voice communication, of course, but when using the CW Keying mode the receiver must be tuned off frequency several hundred cycles in order to hear an audio beat. By providing this shift automatically, CW operation is greatly simplified.

VOX OPERATION

For VOX operation, place the CW MAN/SEMI switch in the MAN position and adjust the VX-2 VOX controls as per the VX-2 operating instructions.

CIRCUIT THEORY

GENERAL DISCUSSION

The Swan 300B transceiver provides single sideband, suppressed carrier transceive operation, and generates the single sideband signal by means of a crystal lattice filter. To permit a logical discussion of this mode of operation certain definitions are necessary. In a normal AM signal, (double sideband with carrier), a radio frequency signal is modulated with an audio frequency signal. This is considered by many to be merely a case of varying the amplitude of the carrier at an audio rate. In fact, however, there are actually sideband frequencies generated, which are the results of mixing the RF and the AF signals. These sidebands are the sum of, and the difference between the two heterodyned signals. In the detection of this conventional AM signal, the two sidebands are mixed with the carrier to recover and reproduce the audio intelligence. This is an inefficient means of transmission, because only 25 percent of the transmitted power is used to transmit intelligence. There are other attendant drawbacks, also. The bandwidth of AM voice transmission is approximately 3 kc. The result demodulated audio is only approximately 3 kc. The result is inefficient use of the frequency band, and over half of the alloted band is unusable ~~ude~~ *due* to heterodynes, interference, and congestion.

In the single sideband, suppressed carrier mode of transmission, only one of the sideband signals is transmitted. The other sideband and the carrier are suppressed to negligible level. In addition to increasing the transmission efficiency by a factor of four, single sideband effectively doubles the number of stations or channels which can be used in a given band of frequencies.

It should be remembered that in the single sideband, suppressed carrier mode of transmitting, the unwanted sideband and carrier are only suppressed, not entirely eliminated. Thus, with a transmitted signal from a transmitter with 50 db sideband suppression, the other or unwanted sideband will be present, and will be transmitted, but its level will be 50 db below the wanted sideband. When this signal is received at a level of 20

db over S9, the unwanted sideband will be present at a level of approximately S5. The same is true of carrier suppression. With carrier suppression of 60 db, and a signal level of 20 db over S9, carrier will be present at a level of approximately S3 to S4.

For the following discussion refer to the schematic diagram, and to Figures 1, 2, and 3.

SIGNAL GENERATION

When the push-to-talk switch on the microphone is pressed, the transmitter portion of the transceiver is activated, and it generates a single sideband, suppressed carrier signal in the following manner. Carrier is generated by Q3 Carrier Oscillator, which is a Pierce oscillator with the crystal operating in parallel resonance. This stage operates in both the transmit and receive modes. When transmitting, the RF output of the oscillator is injected into the control grid of the Balanced Modulator, V13. This balanced modulator is a beam deflection tube, and operates similar to a cathode ray tube in that the electron beam from the cathode is deflected to one output plate or the other by the charge appearing on the deflection plates. The carrier signal fed to the control grid of the balanced modulator appears on both plates of the output. The two plates are connected to Transformer T1301 in push-pull, so the carrier signal cancels itself out in T1301. The deflection plate dc voltages are adjusted by means of the carrier balance control s that the RF being fed to the output plates will cancel out, and the output from T1301 will be zero. Audio signals from the Microphone Amplifier, V14, are applied as a modulating voltage to one deflection plate, and the two sidebands resulting from the sum and difference frequencies of the audio and carrier signals appear in the output of transformer T1301. Carrier suppression is approximately 60 db.

The double sideband, suppressed carrier signal is then coupled from the secondary winding of T1301 to the crystal filter, which suppresses the lower sideband, and permits only the upper sideband to be fed to the First IF Amplifier V7. The carrier frequency is generated at approximately 5500.0 kc, normal sideband. With the opposite sideband crystal, the carrier crystal frequency will be 5503.3 kc, and this positions the double sideband signal on the other side of the filter response curve, attenuating the upper sideband by at least 50 db. In the single conversion mixing process, these sidebands become inverted on 80 and 40 meters. Thus the Swan 300B normally opeates on lower sideband on 80 and 40, while on 20, 15, and 10 meters normal operation is on upper sideband.

Q1, the VFO 2N706 Oscillator, operates in the common base configuration as a Colpitts oscillator. Q2, the buffer is used for isolation. The extremely good regulation achieved through using the Zener diode regulator D1711 across the bias supply voltage, also contributes to the stability.

Bandswitching is accomplished by changing the tank circuit coil. The VFO in the Model 300B exibits extremely good stability after the initial warm-up period. Drift from a cold start will be less than 1 kc for the first hour on 80-, 40-, and 20-meter bands, and less than 2 kc on 10 and 15 meters. After the initial warm-up period, drift will be negligible.

The single sideband, suppressed carrier signal from the firstIF Amplifier is fed to the Transmitter Mixer, V2, where it is heterodyned with the VFO signal. The resultant signal at the desired transmit frequency is amplified by the Driver, V3, and the Power Amplifier, V4. The signal from the VFO Amplifier is initiated in the transistorized VFO/Buffer circuit Q1 and Q2. The signal from the VFO is routed to the VFO Amplifier , and on 40 and 80 meters, is subtractively mixed with the single sideband signal from the IF Amplifier, to result in LSB operation. On 20, 15, and 10 meters, the frequencies are additively mixed, resulting in output on the upper sideband.

When in TRANSMIT, the gain of the First IF Amplifier is controlled through the Automatic Level Control network (using the AGC Amplifier V10) to control the gain of the stage in response to the average input power to the Power Amplifier. This ALC system will compensate for any extremely strong input signals, but does not completely eliminate the necessity of proper adjustment of the Mic. Gain Control. This feature will help prevent the transmitter from flat topping and spurious emissions, but considerable distortion may occur if the Mic. Gain Control is not properly adjusted. Refer to Operating Instructions.

TUNE AND CW OPERATION

Normally, the frequency of the carrier oscillator is approximately 300 cps outside the 6 db passband of the crystal lattice filter. In TUNE position, the frequency of the carrier oscillator is moved approximately 800 cps to place it well within the passband of the crystal lattice filter. A similar procedure is followed for CW to allow full carrier output during CW operation.

RECEIVE

In RECEIVE position, or at any time when the transmitter is not in TRANSMIT, all circuits used in transmitting are disabled through the relay controlled circuits, K1. The relay is energized for transmitting and de-energized for receiving. One contact, when de-energized, allows signals from the transmitting tank circuit and antenna to be fed to the Receiver RF Amplifier, V5, where they are amplified and then fed to the control grid of the Receiver Mixer, V6. The local oscillator signal from the VFO Amplifier is now used to heterodyne the received signal to the IF frequency. All IF amplification is accomplished at this frequency, nominally 5500.0 kc, through V7 and V8 IF amplifiers. In the Product Detector V9A, the IF signal is heterodyned with the carrier frequency generated by Carrier Oscillator, Q3. The resultant audio is then

CIRCUIT THEORY

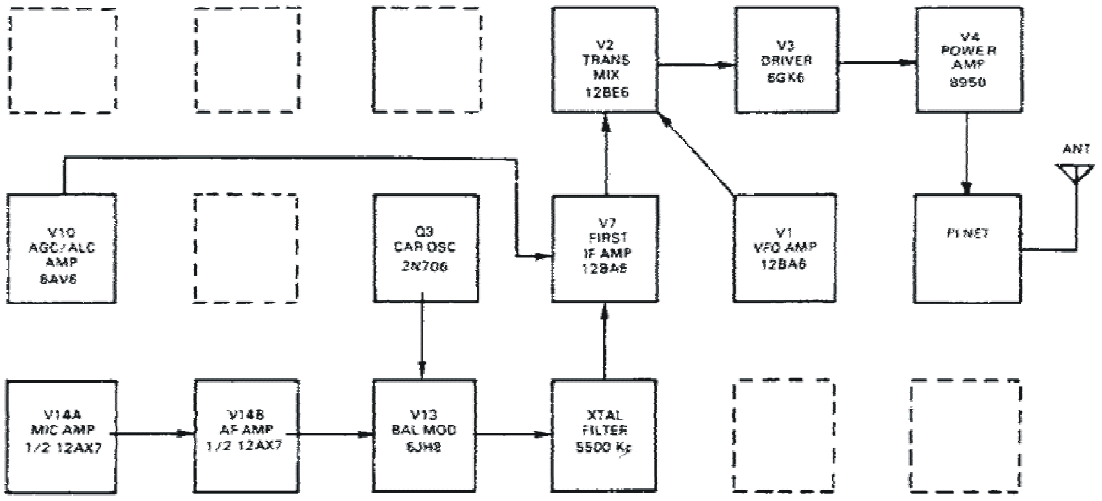


FIGURE 3. BLOCK DIAGRAM, TRANSMIT MODE

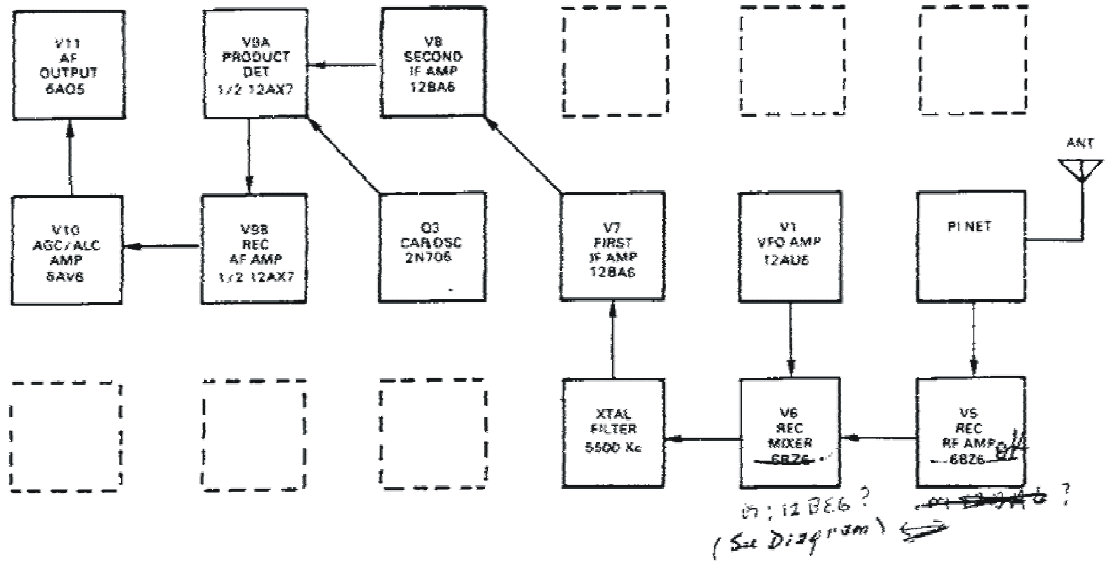


FIGURE 4. BLOCK DIAGRAM, RECEIVE MODE

amplified by V9B, which then couples to V10, the AGC amplifier, and V11, the output audio stage.

FREQUENCY CALIBRATION

Frequency calibration of the Model 300B is in 5 kc increments on 80-, 40-, 20-, and 15-meters, and in 20 kc increments on 10 meters. Dial accuracy and tracking are very good on the 300B, but caution must always be observed when operating near band edges. Measuring the frequency with the 100 kc calibrator when working near band edges is recommended.

DIAL SET

A dial-set control has been provided so that dial adjustment can be made at any 100 kc point on the dial. With calibrator on, set the dial many 100 kc point closest to the frequency you wish to work. Now adjust dial-set control to zero-beat the VFO with the 100 kc Calibrator. This provides greater accuracy of dial readout.

CAUTION

Care must be exercised when tuning for the 100 kc harmonics of the calibrator. Several spurious image signals may be heard, although they will be definitely weaker than the correct harmonics.

TRANSMIT AND RECEIVE SWITCHING

Transmit and receive switching is performed by relay K1. In TRANSMIT position, only those tubes that operate in the transmit mode are operative, all others being biased to cutoff through the relay contacts. In the RECEIVE position, with the relays de-energized, the tubes that are used only in transmit are cut off in the same manner. Relay K1 when de-energized, feeds signals from the output pi-network to the receiver, and is used also to control external switching circuits. In transmit position the meter indicates the cathode current of the power amplifier. In receive position, it indicates the voltage across R703 in the screen grid f the first IF Amplifier, V7, which is inversely proportional to the AGC voltage used to control the gain of the tube. Thus, the meter indicates the relative strength of received signals.

POWER RATING

The Swan 300B is capable of over 200 watts, P.E.P. input under steady state two-tone test conditions. The peak envelope power, when voice modulated, is considerably greater, typically more than 300 watts.

The built-in power supply produces a no-load plate voltage of approximately 880 volts. Under TUNE conditions, or CW operation, this voltage will drop to approximately 680 volts, and the maximum input power will be reduced accordingly. Under voice modulation, because average power is considerably less, the power amplifier plate and screen voltages will be maintained higher, even during voice peaks, by the power supply filter capacitors. Under typical operating conditions, peak plate current before flat-topping will be 375 ma at 800 volts, to result in an nput of 300 wats, P.E.P. Readings of cathode current will nt reflect this power input, however, because of the damping in the cathode current meter, cathode current readings under normal voice input should not average more than 110 to 130 ma.

POWER AMPLIFIER PLATE DISSIPATION

There is often a misunderstanding about the plate dissipation of tubes operated as AB1 amplifiers under voice modulation. In the Swan 300B, while in the transmit position, and with no modulation, the plate voltage will be approximately 830 volts, the plate current 30 ma, and the power input will be 25 watts.

Authorities agree that the average voice power is 10 to 20 db below peak voice power. Normally, some peak clipping in the power amplifier can be tolerated, and a peak-to-average ratio of only 6 db may sometimes occur. Under such conditions, the average dissipation will be approximately 35 watts. The 8950 is rated at 40 watts, continuous duty cycle. Thus it can be seen that under normal operating conditions, the power amplifier tube in the Swan 300B is not being driven very hard. Note, however, that proper modulation level must be maintained by correct setting of Mic. Gain, and that the length of time in TUNE position must be limited to not more than 30 seconds at a time.

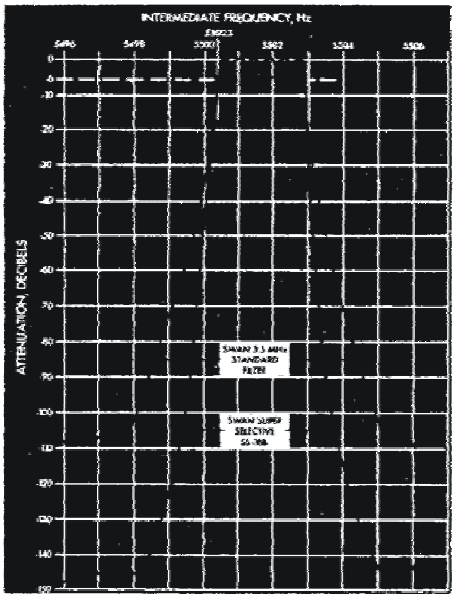


FIGURE 5. CRYSTAL FILTER CHARACTERISTICS

ALIGNMENT AND TROUBLESHOOTING

The alignment procedures presented in this section are routine touch-up procedures for all tuned circuits and other adjustments. It is recommended that the procedures be performed in the order presented. However, if complete realignment is not required (as may be the case when just one tube is replaced), perform just those procedures required. Refer to Figures 5, 6, and 7 for component placement.

RECEIVER ALIGNMENT

Receiver alignment involves only the adjustment of the Second IF coil. The R.F. coils which affect receiver performance are also used in transmit mode. Their adjustment is covered under "TRANSMITTER ALIGNMENT".

1. After following approximately five minutes for warm-up, tune the receiver to the middle of any band and at a "clear" frequency.

2. Adjust the P.A. TUNE, P.A. LOAD, and DRIVER front panel controls for maximum background noise.

3. Adjust IF coil L801 for maximum background noise.

S-METER ADJUSTMENT

With antenna disconnected and R.F. Gain fully clockwise, set R706, located on rear panel, for zero meter reading. Mak

S-METER ADJUSTMENT

With antenna disconnected and RF Gain fully clockwise, set R706, located on rear panel, for zero meter reading. Make sure no local signals are being received.

TRANSMITTER ALIGNMENT

1. Power Amplifier Bias.
   a. Switch meter to P.A. CATH.
   b. After allowing approximately five minutes for warm-up, key the transmitter with the microphone switch. Without speaking into the microphone, adjust the CAR. BAL. control for a minimum power amplifier current.
   c. Again key the transmitter with the microphone switch, and without speaking into the microphone, adjust the P.A. BIAS control on the rear panel for the delta symbol on the meter, corresponding to 40 ma idling current.

2. Transmitter Circuits.
   The alignment of transmitter circuits involves the adjustment of tuned circuits in the VFO Amplifier, V1, the Transmit Mixer, V2, and Driver stage, V3. It is recommended that a dummy load be connected to the antenna jack during this series of adjustments.
   a. Start first by adjusting 7 mc band. Set tuning dial and driver control as indicated by table I, page 12
   b. Set P.A. LOAD control to 9 O'clock.
   c. Press Mic. Button. Check idling current. It should be on the delta symbol with CAR. BAL. control is nulled. Adjust P.A. BIAS control, if required.
   d. With Mic. Button pressed, adjust CAR. BAL. control for slight increase in meter reading, 50 to 60 ma. Adjust P.A. TUNE to resonance, (dip).
   e. Adjust coils as indicated by alignment chart for maximum meter reading. When reading goes higher than 80 ma, or so, adjust CAR. BAL. for 60 ma again.
   f. Adjust coils carefully for maximum peak. Exercise caution with CAR. BAL. control. Do not exceed 100 ma reading for more than a few seconds. Be sure P.A. TUNE control is resonated, (adjusted for "dip" in meter reading).
   g. Switch to 3.5 mc band, and repeat steps (a) through (f), following the tuning chart carefully. Follow this procedure through for each other band.

3. Power Amplifier Neutralization.
   Perform the power amplifier neutralization adjustment on 20 meters and in the following manner.
   a. After allowing approximately five minutes for warm-up, tune the transmitter to approximately 14.250 mc.
   b. Position the P.A. LOAD control to the 9 o'clock position, (full counter clockwise).
   c. Set meter switch to P.A. CATH.
   d. Key the transmitter with the microphone switch, and without speaking into the microphone, adjust the CAR. BAL. control for a power amplifier current of approximately 100 ma. Adjust the DRIVER control for peak. Quickly adjust CAR. BAL. to 100 ma again if it increased to a higher reading.
   e. With the Mic. Button still pressed, rotate the P.A. TUNE control through its range from 9 o'clock to 3 o'clock. You will note a pronounced "dip" in meter reading at resonance. Observe any tendency for the meter to "peak" above the 100 ma plateau on either side of resonance. If there is such a peak, adjust C402, the P.A. Neutralizing trimmer to suppress the peak. When properly neutralized, the meter reading will hold steadily at 100 ma except for the sharp dip at resonance but there will be no peak above the 100 ma level.
   f. Key the transmitter with the microphone switch and re-adjust the CAR. BAL. control for minimum power amplifier current. Power amplifier idling current should be on the delta symbol. If not, repeat the power amplifier bias adjustment described on Page 12.

4. Carrier Frequency Adjustment.
   A dummy load wattmeter and audio generator are required for this adjustment.

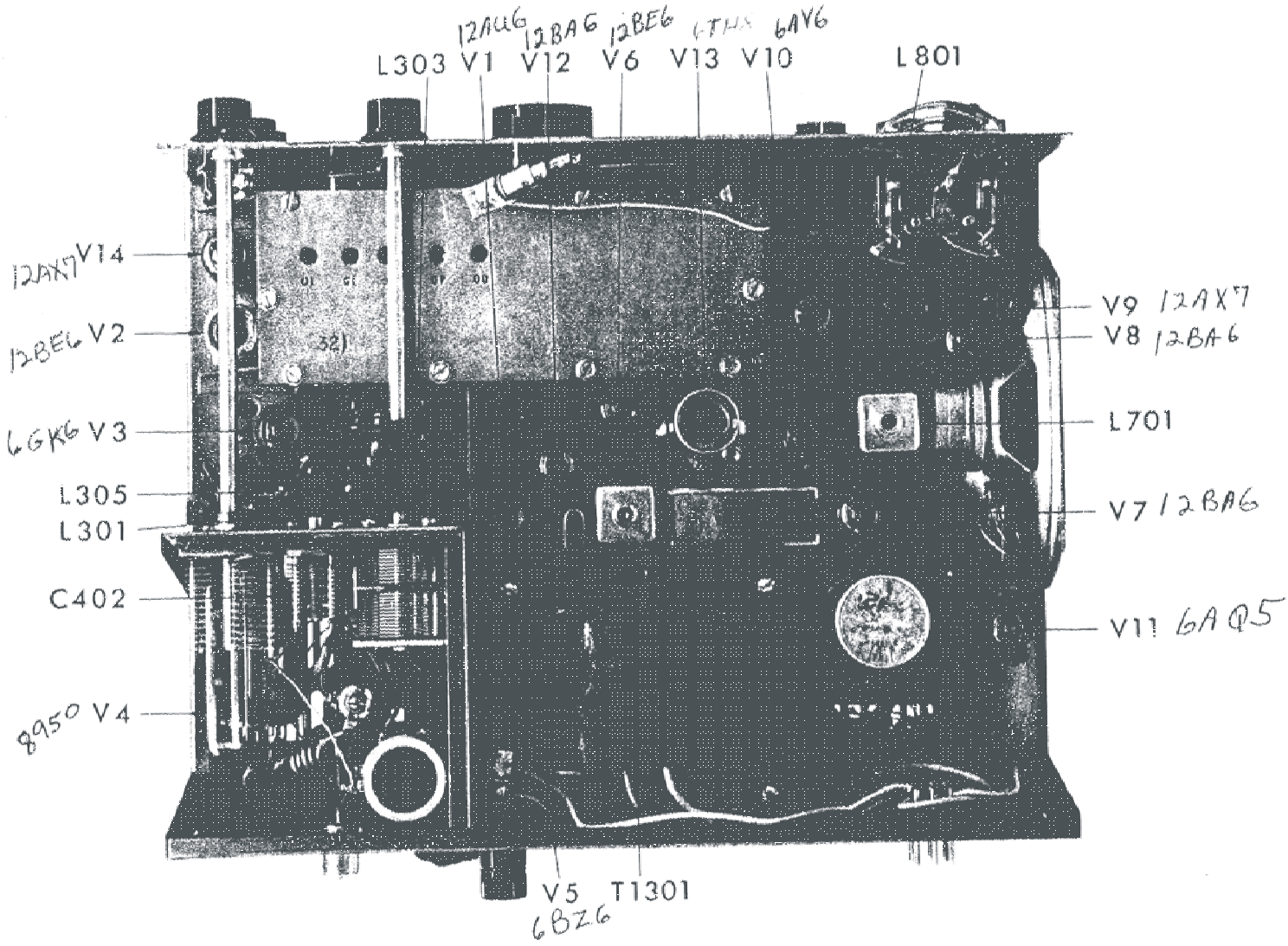


FIGURE 6. SWAN CYGNET MODEL 300B TOP VIEW

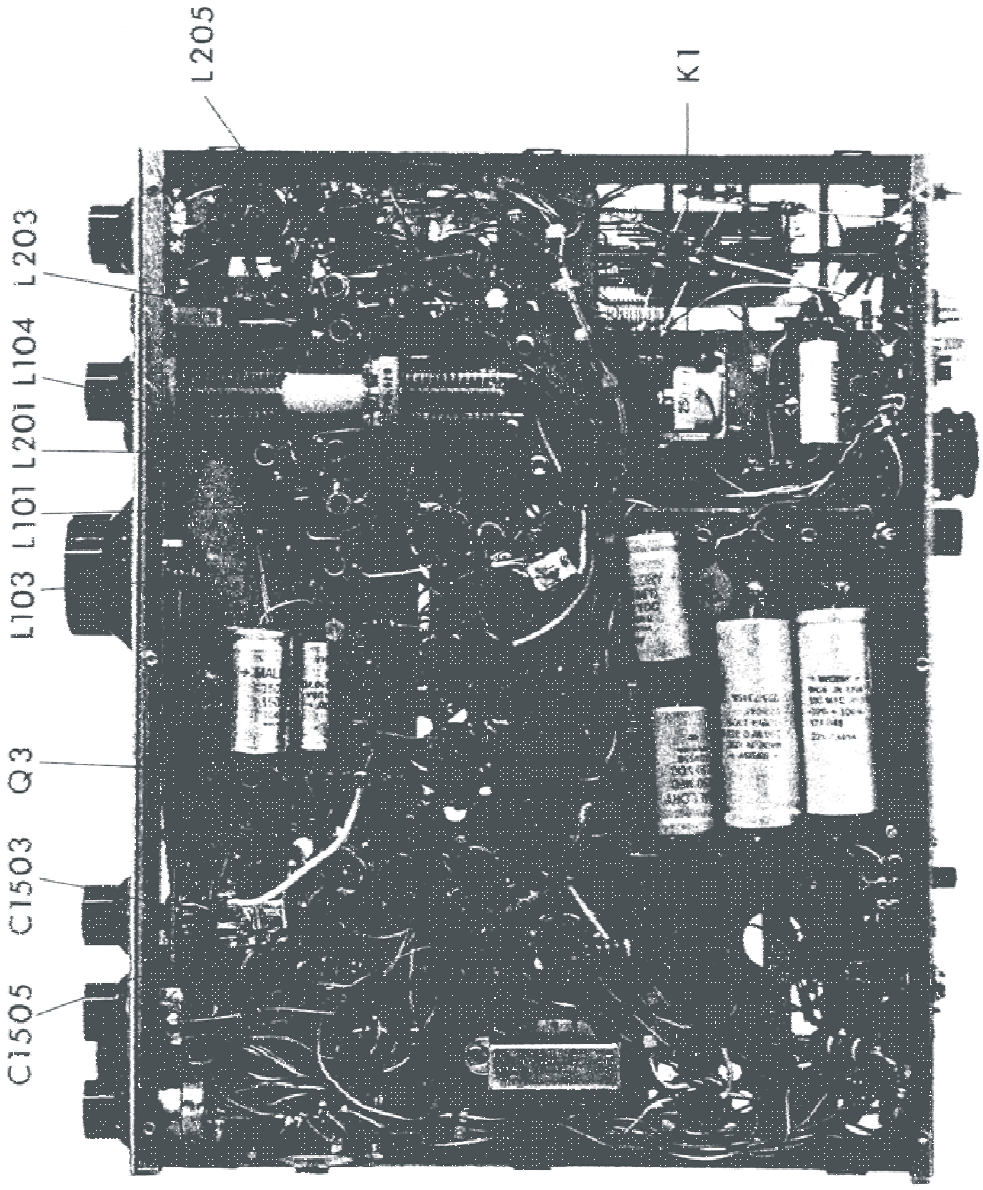


FIGURE 7. SWAN CYGNET MODEL 300B BOTTOM VIEW

a. After allowing a five-minute warm-up period, tune the transmitter to approximately 14,250 mc.
b. Key the transmitter with the microphone switch and adjust the CAR. BAL. control for minimum power amplifier current.
c. Insert 1500 cycles of audio from an audio generator into the Mic. Jack located on the front panel. Adjust the gain of the audio generator and the Mic. Gain control (R1404) until the wattmeter reads approximately 10 or 15 watts.
d. Adjust the first IF coil (L701) for maximum output. Adjust both slugs of the balanced modulator transformer (T1301) for maximum output.
e. Increase gain of audio generator until wattmeter reads 40 watts. Sweep generator down to 300 cycles and adjust the normal sideband carrier oscillator trimmer (C1502) for a reading of 10 watts.
f. Switch to the Opposite Sideband. Adjust the Opposite Sideband Carrier Oscillator trimmer (C1504) for a reading of 10 watts.
g. Re-check with audio generator set at 1500 cycles and 40 watts. Sweep down to 300 and re-adjust Carrier Oscillator capacitor, if required, for 10 watts.

5. Carrier Balance Adjustment.
Several times during the preceding adjustments, the CAR. BAL. control has been adjusted for varying reasons. Be sure that this control is always re-set for exact null before operating.

NOTE

If at any time the Balanced Modulator Tube (6JH8) is replaced it may be necessary to adjust R1303, the Mini Potentiometer located on the 6JH8 tube socket, for exact Carrier Balance Null. This control is factory set and should not need adjustment except in case of tube replacement. A recommended way of adjusting the control is to locate your transmitting signal on an external receiver. Then adjust R1303 for minimum carrier while listening to the external receiver.

VFO CALIBRATION

1. After allowing approximately five minutes for warm-up, tune the receiver near 3800 kc. Using a frequency standard or a 100 kc crystal calibrator as an accurate signal source, tune the signal for zero beat and note the corresponding dial reading. If the 3800 kc signal does not zero beat at 3800 on the dial, adjust the 80 Meter trimmer until it does.

2. In a similar manner, check each of the other bands in the normally used portion of the band. For example: 7200 kc, 14,200 or 14,300, 21,300, or 21,400, 28,700 or whichever portion of 10 meters is normally used. Accuracy in other parts of the bands will be quite good, but remember that the Cygnet is not to be considered a frequency standard. Be cautious when operating near band edges. FCC regulations require that every amateur radio station have a means available for measuring his transmitting frequency.

If a frequency meter or frequency counter is available, the information contained in Table II can be used to perform direct VFO and Carrier Oscillator frequency measurements.

TROUBLESHOOTING

The information contained in Figures 5, 6, and 7, together with the voltage and resistance chart and troubleshooting guide should be sufficient for most troubleshooting by the average licensed amateur radio operator.

VOLTAGE AND RESISTANCE CHART

TUBE TYPE	R = Rec. T = Trans.	SOCKET PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V1 12BA6 VFO Amp.	R Volts	-.6	0	0	12.6AC	45	45	0		
	T Volts	-.6	0	0	12.6AC	50	50	0		
	Ohms	1.2K	0	0	0.2	0	*	0		
V2 12BE6 Trans. Mixer	R Volts	-1.2	0	0	12.6AC	250	-2	0		
	T Volts	-1.0	0	0	12.6AC	250	135	0		
	Ohms	100K	0	0	.02	*	11K	35K		
V3 6GK6 Driver	R Volts	0	-6.7	0	0	6.3AC	NC	255	0	0
	T Volts	0	-6.7	0	0	6.3AC	NC	265	225	0
	Ohms	10	100K	0	0	0.3	NC	*	0.2	0
V5 6CBGA Rec. R. F.	R Volts	0	0	6.3AC	0	255	115	0		
	T Volts	0	0	6.3AC	0	255	0	0		
	Ohms	1.1M	0	0.1	0	14K	40K	0		
V6 6BZ6 Rec. Mixer	R Volts	0	0	0	6.3AC	250	100	-5		
	T Volts	0	0	0	6.3AC	265	0	-5		
	Ohms	100K	0	0	0.1	11K	40K	45K		
V7 12BA6 1st I. F.	R Volts	-1.8	0	0	12.6AC	210	48	0		
	T Volts	-1.8	0	0	12.6AC	220	50	0		
	Ohms	500	0	0	0.1	15K	50K	0		
V8 12BA6 2nd I. F.	R Volts	-1.7	0	0	12.6AC	205	105	0		
	T Volts	-1.7	0	0	12.6AC	225	0	0		
	Ohms	110K	0	0	0.1	15K	40K	0		
V9 12AX7 Det. A. F.	R Volts	55	-1	0	0	0	145	-2.5	0	6.3AC
	T Volts	-3	-1.6	0	0	0	0	-.25	0	6.3AC
	Ohms	400K	11K	300	0	0	125K	1M	0	0.2
V10 6AV6 AGC Amp.	R Volts	0	2.0	6.3AC	0	0	0	225		
	T Volts	0	1.6	6.3AC	0	0	0	175		
	Ohms	500K	5K	0.2	0	0	700K	100K		
V11 6AQ5 A. F. Output	R Volts	-9	0	0	6.3AC	237	215	NC		
	T Volts	-9	0	0	6.3AC	262	0	NC		
	Ohms	500K	0	0	0.2	10K	12K	NC		
V12 12BA6 100KC Cal.	R Volts	0	0	12.6AC	225	225	75			
	T Volts	0	0	12.6AC	175	175	55			
	Ohms	1M	0	0.1	100K	200K	0			
V13 6JH8 Bal. Mod.	R Volts	0	0	0	6.3AC	0	-1.4	0	0	0
	T Volts	45	45	75	6.3AC	0	-1.4	0	0	100
	Ohms	2K	75K	500K	0.2	0	35K	0	75K	75K
V14 12AX7 Mic. Amp.	R Volts	50	0	0	0	0	0	0	0	6.3AC
	T Volts	45	0	0	0	0	75	0	0	6.3AC
	Ohms	1M	0	0	0		600K	0	10K	0.2
		1	2,5	3,11	4,10	5,9	7,8	12		
V48950 V4 8950	R Volts	0	0	0	0	-75	NC	12.6AC		
	T Volts	0	0	225	0	-75	NC	12.6AC		
	Ohms	0	1.0	100	0	6K	NC	1		

TABLE I
TRANSMITTER ALIGNMENT CHART

BAND	DRIVER SETTING	TUNING DIAL	ADJUST COILS
40	12 o'clock	7180KC	L103, L202, L302
80	12 o'clock	3790KC	L201, L301
20	12 o'clock	14205KC	L203, L303
15	12 o'clock	21270KC	L101, L204, L304
10	12:30 o'clock	28920KC	L102*, L104*, L205, L305

Note: Adjust 40 Meter band first

*To adjust L102, connect one end of a 2.7K resistor to the hot side of L104. Connect a .10 uf disc capacitor from ground to the other end of the resistor. Adjust L102. To adjust L104, use the same procedure as above, but connect the capacitor and resistor to L102.

TROUBLESHOOTING CHART

DEFECTIVE	POSSIBLE CAUSE
PA Idling Current Unstable	1. Defective Power Amplifier Tube (V4). 2. Defective BIAS control and/or associated components. 3. Defective bias power supply.
Inability to Load per Operation Instructions	1. Antenna not resonant at operating frequency. 2. Defective transmission line. 3. Defective antenna loading coil(s). 4. Tubes V1 through V4 defective.
Insufficient Sideband Suppression	1. Carrier Oscillator (Q3) operating on incorrect frequency. 2. Crystal filter defective or mistuned.
Insufficient Carrier Suppression	1. Tube V13 defective. 2. Transformer T1301 defective or mistuned. 3. Carrier Oscillator (Q3) operating on incorrect frequency.
Microphonics in Transmitter	1. Tubes V13 and/or V14 defective. 2. IF coil L701 Defective or incorrectly adjusted. 3. Microphone defective.
Low Receiver Sensitivity	1. Tubes V5 through V10 defective. 2. Incorrect adjustment of the transmitter Pi-Network. 3. IF coil L801 incorrectly adjusted or defective. 4. K1 relay contacts defective.

TABLE II
VFO AND CARRIER OSCILLATOR FREQUENCIES

TUNING DIAL	V1 INJECTION FREQUENCY	Q1 OSC. FREQUENCY	Q3 OSC. CARRIER FREQUENCY
3,500 KC	9,000 KC	9,900 KC	5,500 KC
4,400 KC	9,500 KC	9,500 KC	5,500 KC
7,000 KC	12,500 KC	(1/2) 6,250 KC	5,500 KC
7,300 KC	12,800 KC	(1/2) 6,400 KC	5,500 KC
14,000 KC	8,500 KC	8,500 KC	5,500 KC
14,350 KC	8,850 KC	8,850 KC	5,500 KC
21,000 KC	15,500 KC	(1/2) 7,750 KC	5,500 KC
21,450 KC	15,950 KC	(1/2) 7,975 KC	5,500 KC
28,000 KC	22,500 KC	(1/2) 11,250 KC	5,500 KC
29,700 KC	24,200 KC	(1/2) 12,100 KC	5,500 KC

PARTS LIST

RESISTORS

All resistors are ½ watt 10% Tolerance, unless otherwise noted.

R101	1.5K
R102	47K
R103	2.7K
R104	2.7K
R105	10K-2W
R201	27K
R202	100K
R203	100K
R204	10K-2W
R205	470K
R206	2.7K
R301	100K
R302	100K
R303	100 ohm
R401	100 ohm
R402	25K bias pot
R403	4.7K
R404	1K
R405	3 ohm 5 W
R406	100 ohm 5 W
R501	100K
R502	220K
R503	470 ohm
R504	10K
R505	25K R.F. Gain
R506	10K
R507	470K
R601	47K
R602	100K
R701	470 ohm
R702	10 meg
R703	33K-2W
R704	1K
R705	33K
R706	25K S-Meter Zero
R707	15K
R708	47K 1W
R801	100K
R802	1K
R901	10K
R902	47K
R903	270 ohm
R904	270K
R905	47K
R906	10 meg
R907	1 meg
R908	47K
R909	100K
R1001	470K
R1002	270K
R1003	1 meg
R1004	4.7K
R1005	15K
R1101	1 meg A.F. Gain Pot
R1102	47K
R1103	220K
R1104	1M
R1105	1M
R1201	1 meg
R1202	27K
R1203	100K
R1301	1K
R1302	10K
R1303	10K Quad. Pot.
R1304	270K
R1305	10K-3W
R1306	27K
R1307	27K
R1308	5K Car. Bal. Pot.
R1309	1K
R1310	100K
R1311	27K
R1401	150K
R1402	47K
R1403	1K
R1404	1 meg Mic. Gain Pot
R1405	2.2 meg
R1406	270K
R1407	470K
R1408	47K
R1501	18K
R1502	2.2K
R1503	1.5K
R1504	100 ohm
R1505	100K, 2W
R1601	2.7K
R1602	1.5K
R1603	1K
R1604	470 ohm
R1605	2.7K
R1606	1K
R1607	470 ohm
R1701	4.7 ohm
R1702	10K-2W
R1703	150K-2W
R1704	150K-2W
R1705	800 ohm-10W
R1706	1.2K-5W
R1707	270K
R1708	2.7K
R1709	800 ohm-10W
R1710	500 ohm-10W
R1711	100K
R1712	6.8K, ½W

TRANSISTORS

Q1	2N706 Oscillator
Q2	2N5130 Buffer
Q3	2N706 Carrier Oscillator

DIODES

D501	1N914
D701	1 Amp 600V
D702	1 Amp 600V
D1001	1N914
D1101	1N4005
D1102	1N4005
D1201	1N34A
D1701	1N3195
D1702	1N3195
D1703-1706	1N3195
D1707-1710	1N3195
D1711	1N4742 Zener
D1712	1N3195
D1713	1N4005

CAPACITORS

Unless otherwise specified, a capacitor is listed in pico farads with a whole number and in micro-farads with a decimal number.

C101	.01 +80-20%, 500V Disc
C102	44 pf Disc
C103	60 pf Disc
C104	.01 +80-20% 500V Disc
C105	68 pf 5% Disc
C106	25 pf 5% Disc
C107	.002, 20% 1 KV Disc
C108	30 pf
C201	.05 10% 200V Mylar
C202	.01 +80-20% 500V Disc
C203	68 pf 5% Disc
C204	39 pf 10% Disc
C205	.01 +80-20% 500V Disc
C206	470 pf 5% SM
C207	2 pf 10% 500V Ceramic
C208	.002 20% 1 KV Disc
C301	.002 20% 1 KV Disc
C302	68 pf 5% Disc
C303	39 pf 1% Disc
C304	15 pf 10% Disc
C305	510 pf 5% SM
C306	15 pf 3 KV Disc
C307	.002 20% 1 KV Disc
C308	270 pf 10% Disc
C401	3.3 pf 10% 3 KV
C402	20 pf Neut. Trimmer
C403	.01 +80-20% 1 KV Disc
C404	.002 20% 1 KV Disc
C405	.01 +80-20% 500V Disc
C407	560 5% .6 KV
C408	105 pf P.A. Tune
C409	100 10% 6 KV Disc
C410	330 10% 500V Mica
C411	820 pf P.A. Load
C412	.01
C413	.01
C501	.01 +80-20% 500V Disc
C502	.01 +80-20% 500V Disc

C503	30 pf 10% 1 KV Disc
C601	.01 +80-20% 500V Disc
C602	220 10% Disc
C603	430 pf 5% SM
C701	1 mfd 50V
C702	50 pf 5% Disc
C703	.01 +80-20% 500V Disc
C704	.01 +80-20% 500V Disc
C801	.01 +80-20% 500V Disc
C802	.01 +80-20% 500V Disc
C803	50 pf 5% Disc
C804	50 pf 5% Disc
C805	.01 +80-20% 500V Disc
C901	220 pf 20% Disc
C902	.002 20% 1 KV Disc
C903	150 pf 10% Disc
C904	2 mfd 450 V Electrolytic
C905	500 pf 20% Disc
C906	.032 20% Disc
C907	.001 20% Disc
C1001	.05 10% 200V Mylar
C1002	.05 10% 200V Mylar
C1003	.001 20% Disc
C1004	.01 +80-20% 500V Disc
C1101	5 mfd 450V
C1102	.001 20% Disc
C1103	.01
C1104	.005
C1105	.005
C1201	60 pf Trimmer
C1202	150 pf 10% Disc
C1203	50 pf 5% Disc
C1301	.01 +80-20% 500V Disc
C1302	.01 +80-20% 500V Disc
C1303	.01 +80-20% 500V Disc
C1304	.01 +80-20% 500V Disc
C1305	.01 +80-20% 500V Disc
C1306	220 pf 10% Disc
C1307	.002 20% 1 KV Disc
C1401	.01 +80-20% 500V Disc
C1402	.1 10% 400V Mylar
C1403	.01 +80-20% 500V Disc
C1404	100 pf 10% Disc
C1405	1 mfd. 400V
C1406	.01 +80-20% 500V Disc
C1501	15 pf 5% Disc
C1502	8 pf Piston Trimmer
C1503	20 pf 5% Disc
C1504	8 pf Piston Trimmer
C1505	270 pf N2200 10% Disc
C1506	270 pf N2200 10⅓% Disc
C1507	.01 +80-20% 500V Disc
C2A	50 pf Driver Tuning
C2B	50 pf Driver Tuning
C1601	10 pf Selected
C1602	5 pf Trimmer
C1603	70 pf Selected
C1604	10 pf Trimmer
C1605	44 pf Selected
C1606	15 pf Trimmer
C1607	127 pf Selected
C1608	15 pf Trimmer
C1609	35 pf Selected
C1610	15 pf Trimmer
C1611	2 pf Dial Set Trimmer
C1612	20 pf Main Tuning
C1613	22 pf N220
C1614	.01 +80-20% 500V Disc
C1615	270 pf SM
C1616	430 pf SM
C1617	27 pf SM
C1618	.01 +80-20% 500V Disc
C1619	.01 +80-20% 500V Disc
C1620	.002 20% 1 KV Disc
C1701	.0047 1 KV
C1702	.0047 1 KV
C1703	100 mfd 35V
C1704	.01 +80-20% 500V Disc
C1705	.01 +80-20% 500V Disc
C1706	5 mfd 450V Electrolytic
C1707	40 mfd 350V Electrolytic
C1708	40 mfd 350V Electrolytic
C1709	80 mfd 150V Electrolytic
C1710A	80 mfd 450V Electrolytic
C1710B	80 mfd 450V Electrolytic
C1710C	5 mfd 450V Electrolytic
C1710D	5 mfd 450V Electrolytic
C1711	80 mfd 150V Electrolytic
C1712	80 mfd 150V Electrolytic
C1713	.01 +80-20% 500V Disc
C1714	.002-20% Disc
C1715	.01 +80-20% 500V Disc.

COILS

L101	15 MTR VFO Amp
L102	10 MTR VFO Amp
L103	VFO Amp
L104	10 MTR VFO Amp
L201	80 MTR Mixer
L202	40 MTR Mixer
L203	20 MTR
L204	15 MTR Mixer
L205	10 MTR Mixer
L301	80 MTR Driver
L302	40 MTR Driver
L303	20 MTR Driver
L304	15 MTR Driver
L305	10 MTR Driver
L306	82 u
L401	82 u
L402	55 u
L403	Pi-Network
L404	30 u
L701	5500 kc IF
L801	5500 kc IF
L1501	200 u
L1601	VFO Coil
L1602	200 u
L1603	200 u
L1604	200 u
L1701	17 u
L1702	200 u

TRANSFORMERS

T1101	A.F. Output Trans.
T1301	500 kc Bal. Mod. Trans.
T1701	Power Trans.
Z401	Parasitic Suppresser

RELAYS

K1	3 PDT Relay. 12 VDC Coil

CRYSTALS

Y1201	100 kc Crystal Calibrator
Y1501	5500 kc Carrier Oscil.
Y1502	5503.3 kc Carrier Oscil.

TUBES

V1	12AU6 VFO Amplifier
V2	12BE6 Trans. Mixer
V3	6GK6 Driver
V4	8950 Power Amplifier
V5	6CB6A Rec. RF Amp.
V6	12BE6 Rec. Mixer
V7	12BA6 First IF Amp
V8	12BA6 Second IF Amp
V9	12AX7 Prod. Det./ Rec. A.F.
V10	6AV6 AGC Amp
V11	6AQ5 AF Output
V12	12BA6 100 kc Cal.
V13	6JH8 Bal. Mod.
V14	12AX7 Mic. Amp

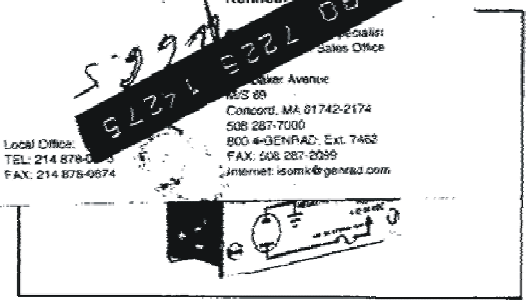
SWITCHES

S1-A, B, C, D, E	Band Switch
S2	Power On & Off (part of AF Gain)
S3	Cal. Rec. Tune/CW
S4	P.A. Cathode/S-Meter
S5	Sideband Selector

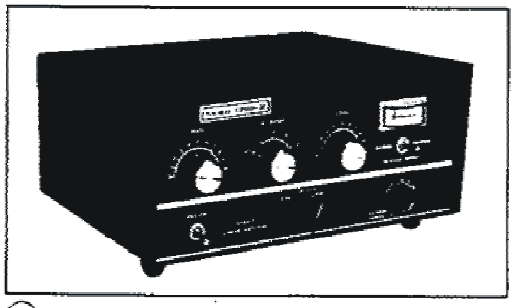
ACCESSORIES

GenRad
Kenneth
Sales Office
Baker Avenue
Concord, MA 01742-2174
508 287-7000
800 4-GENRAD: Ext. 7462
FAX: 508 287-2099
Local Office:
TEL: 214 878-
FAX: 214 878-9674

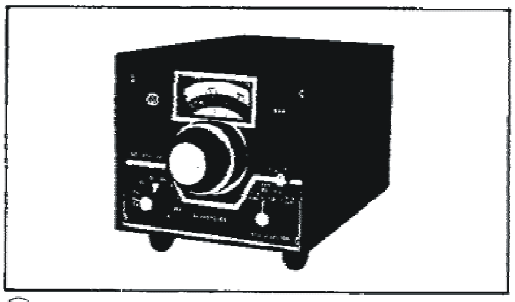
with the Model 300B transceiver:



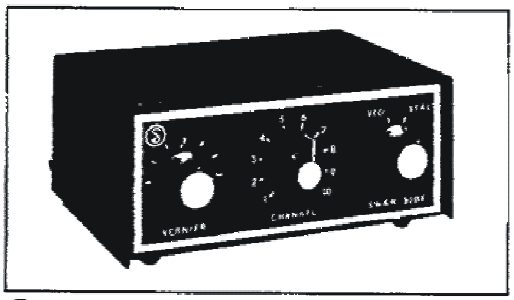
(A) MODEL 14A PLUG-IN DC CONVERTER FOR 12 TO 14 VOLT DC OPERATION



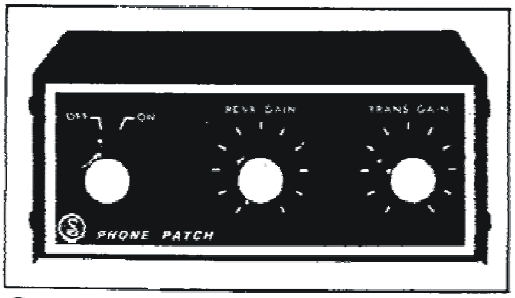
(B) MODEL 1200-W LINEAR AMPLIFIER 1200 WATTS P.E.P. INPUT, 5 BANDS



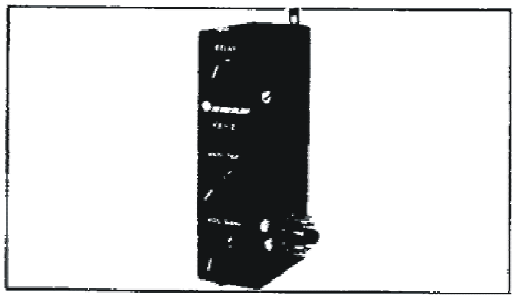
(C) MODEL 508 EXTERNAL VFO FOR SEPARATE RECEIVE-TRANSMIT FREQUENCY. PLUGS DIRECTLY INTO BACK OF 300B



(D) MODEL 510X CRYSTAL CONTROLLED EXTERNAL OSCILLATOR. PLUGS DIRECTLY INTO BACK OF 300B

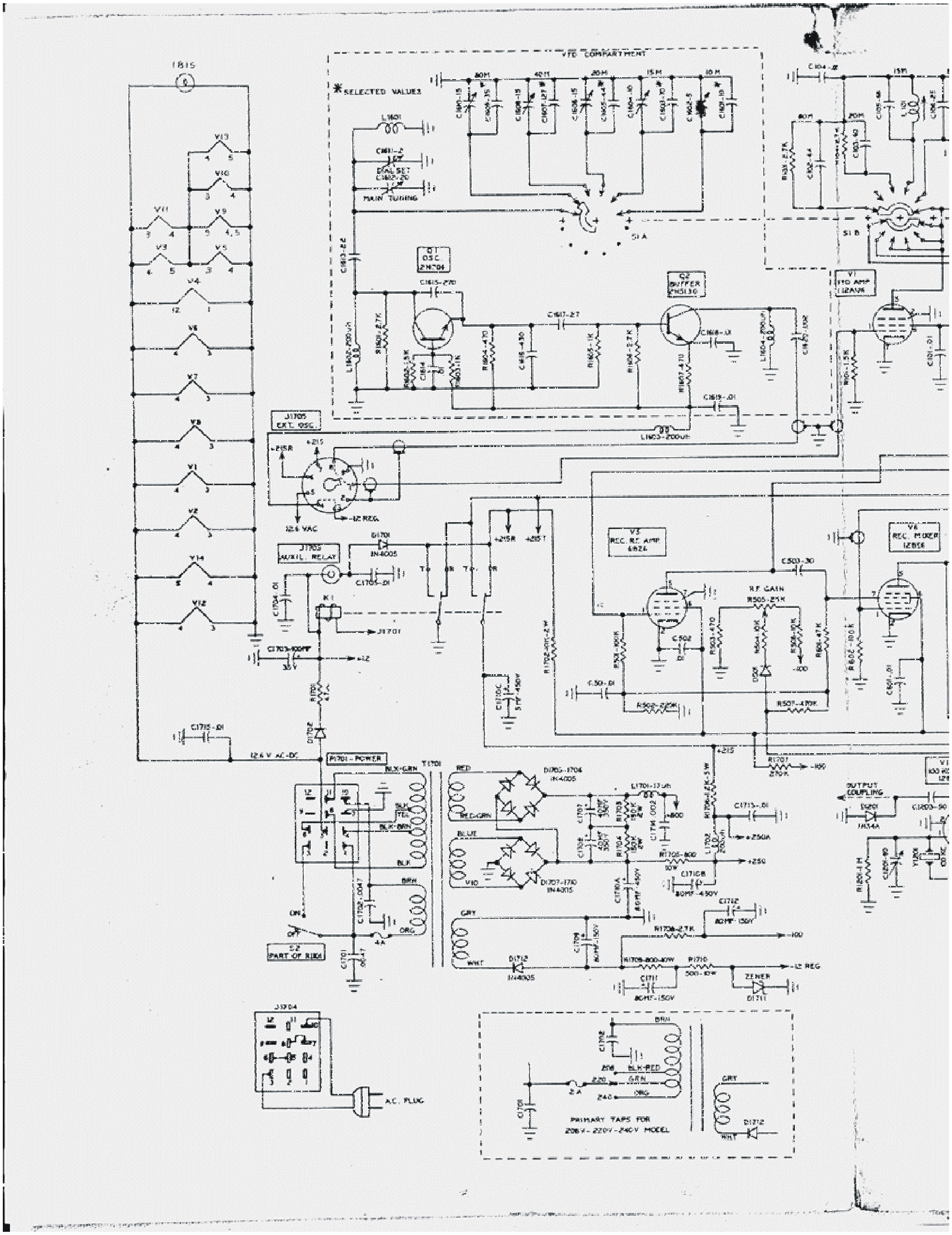


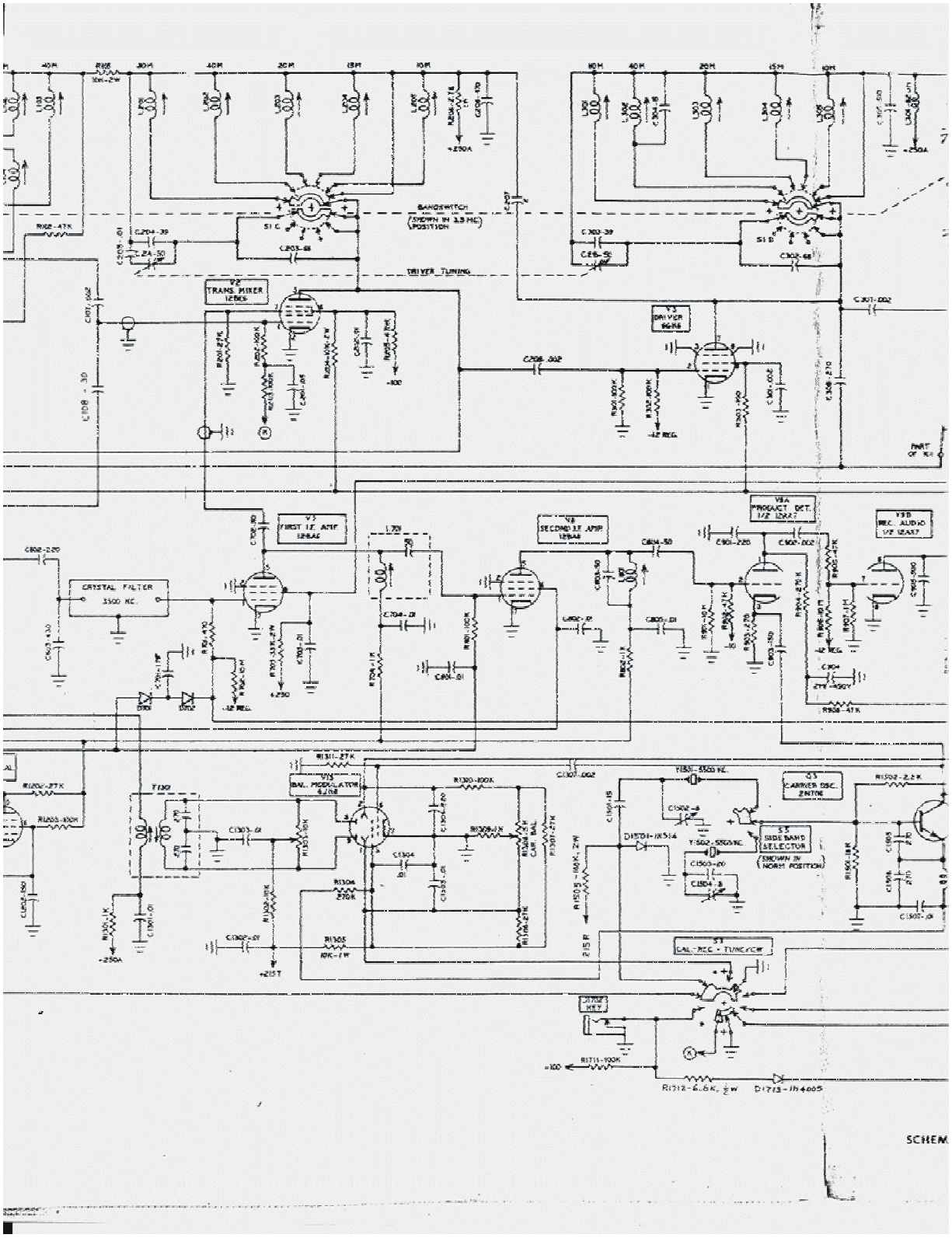
(E) SWAN HYBRID PHONE PATCH MODEL FP-1

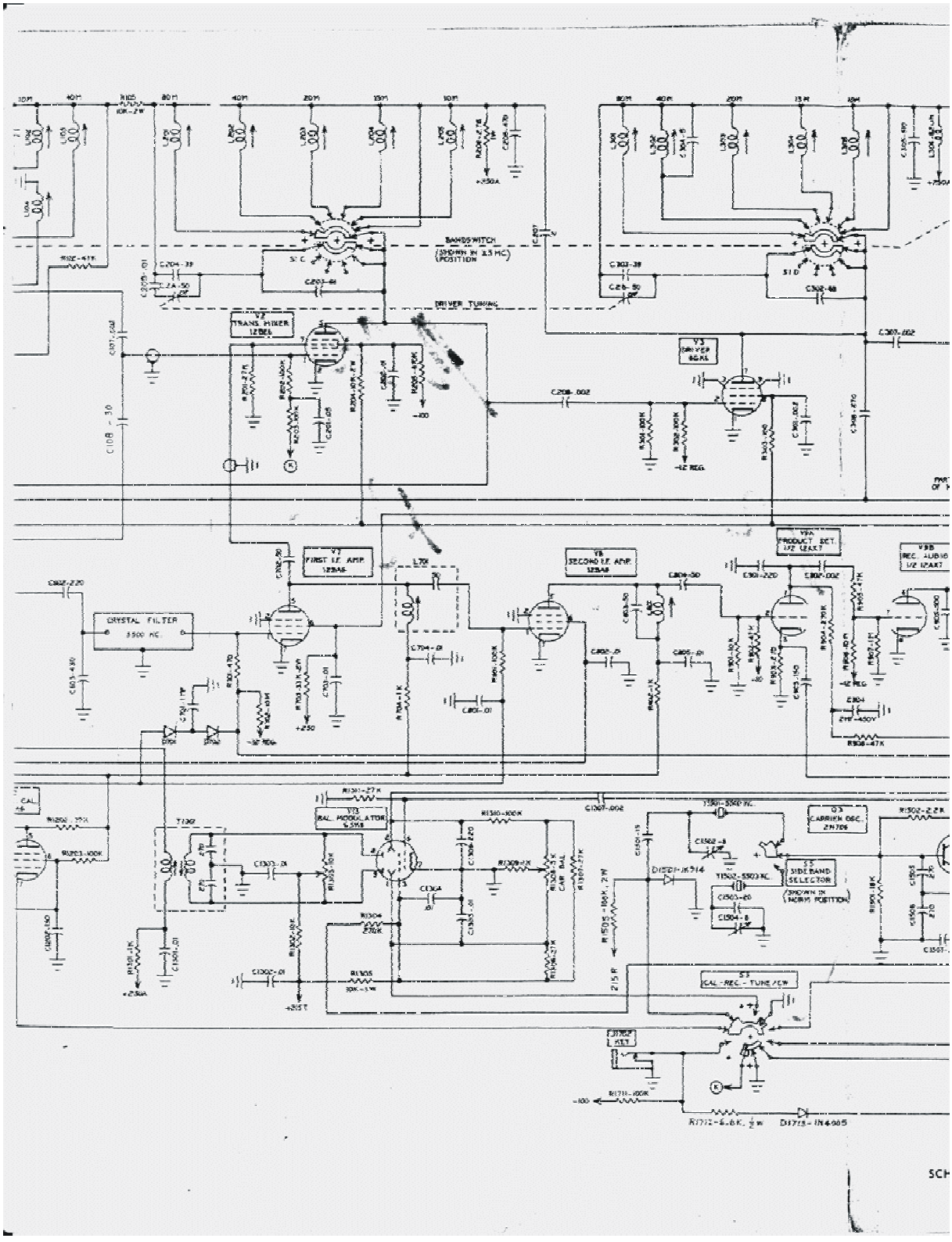


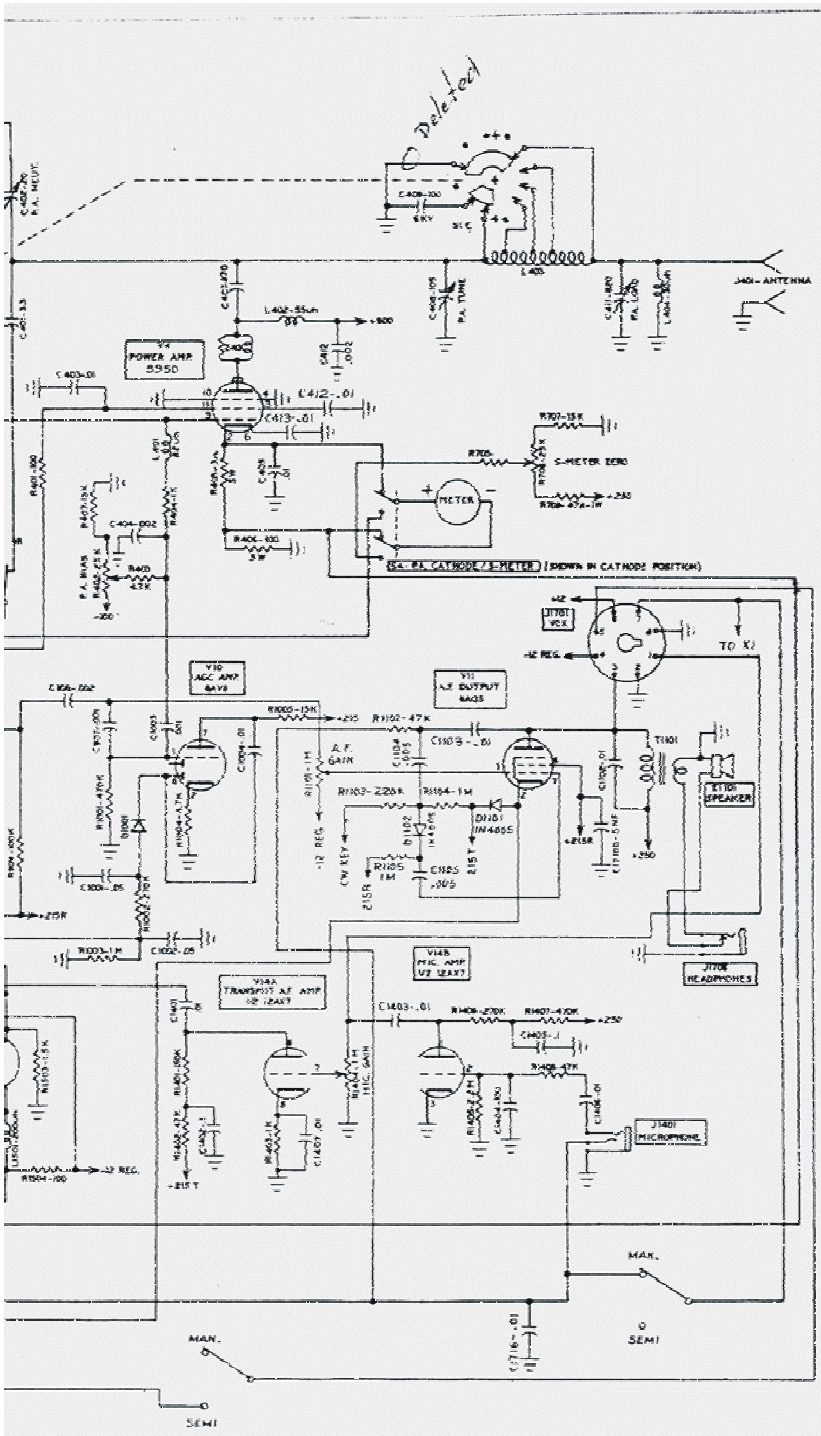
(F) MODEL XV-2 PLUG-IN VOX UNIT. PLUGS DIRECTLY INTO SIDE OF 300B

See your Swan Dealer for further information.


VFO COMPARTMENT
SELECTED VALUES
MAIN TUNING
DIAL SET
Q1 OSC. 2N706
Q2 BUFFER 2N5130
V1 VFO AMP 12AV6
J1705 EXT. OSC.
J1703 AUXIL. RELAY
V3 REC. RF. AMP 6BZ6
V4 REC. MIXER 12BE6
RF GAIN
P1701 - POWER
S2 PART OF R1101
A.C. PLUG
OUTPUT COUPLING
ZENER
PRIMARY TAPS FOR 208V - 220V - 240V MODEL


40M
30M
20M
15M
10M
BANDSWITCH (SHOWN IN 3.5 MC. POSITION)
TRIVER TUNING
V2 TRANS. MIXER 12BE6
V3 DRIVER 6BA6
V4 FIRST I.F. AMP. 12BA6
V5 SECOND I.F. AMP. 12BA6
V6A PRODUCT DET. 1/2 12AX7
V6B REC. AUDIO 1/2 12AX7
CRYSTAL FILTER 3300 KC.
V7 BAL. MODULATOR 6JD8
V8 CARRIER OSC. 2N706
S5 SIDE BAND SELECTOR
(SHOWN IN NORM POSITION)
S3 CAL-REC-TUNE/CW
D1702 KEY
PART OF S1
SCHEM


BANDSWITCH
(SHOWN IN 3.5 MC)
POSITION
DRIVER TUNING
V2
TRANS MIXER
12BE6
V3
DRIVER
6GK6
V7
FIRST I.F. AMP.
12BA6
V8
SECOND I.F. AMP.
12BA6
V9A
PRODUCT DET.
1/2 12AX7
V9B
REC. AUDIO
1/2 12AX7
CRYSTAL FILTER
3500 KC.
V3
BAL. MODULATOR
6.5Y8
Q3
CARRIER OSC.
2N706
S5
SIDEBAND
SELECTOR
(SHOWN IN
LOWER POSITION)
S3
CAL - REC. - TUNE / CW
D1501-1N914
D1713-1N4005
R1712-6.8K, ½ w
+250A
+250
+25V
-12 REG.
-100



MATIC DIAGRAM – SWAN CYGNET MODEL 300B

SWAN ELECTRONICS